



U.S. Department
of Transportation
**Federal Aviation
Administration**

PROPOSED TECHNICAL STANDARD ORDER

Attached is proposed Technical Standard order (TSO), C123a, Cockpit Voice Recorder Systems for your review and comment.

Comments submitted must be received on or before July 21, 1995, and must identify the TSO file number shown in the Federal Register notice dated April 19, 1995, Vol. 60, No. 75, Page 19621. Send all comments on the proposed TSO to:

Federal Aviation Administration
Technical Programs and Continued Airworthiness
Branch, AIR-120
Aircraft Engineering Division
Aircraft Certification Service - File No. TSO-123a
800 Independence Avenue, SW.
Washington, DC 20591

Distribution: ZVS-326;A-W(IR)-3;A-X(FS)-3;A-FFS-1,2,7,8(LTD);A-FAC-0(MAX)
A-X(CD)-4;AVN-1 (2 cys)

PROPOSED TECHNICAL STANDARD ORDER (TSO)

Subject: TSO-C123a, Cockpit Voice Recorder System

a. Applicability.

(1) Minimum Performance Standards. This technical standard order (TSO) prescribes the minimum performance standard that manifold pressure instruments must meet in order to be identified with the applicable TSO marking. Cockpit voice recorder systems that are to be so identified and that are manufactured on or after the date of this TSO must meet the standards set forth in the European Organisation for Civil Aviation Electronics (EUROCAE), ED-56A, "Minimum Operational Requirements for Cockpit Voice Recorder System," Chapter 4, 5, and 6, dated October 1993.

(2) Additional Information. The European Organization for Civil Electronic (EUROCAE) Document ED-55 Minimum Operational Requirements for Flight Data Recorder Systems dated January 1990 contains recommended test procedures for performing the crash survivability tests required by EUROCAE ED-56.

NOTE: It should be noted that ED-56 does not address the technology of digital processing of voice signals as would be required for a solid-state voice recorder.

(3) Fire Test Requirements. The high temperature fire test procedure specified in EUROCAE ED-56A "5.3 TEST PROCEDURES FOR CRASH SURVIVAL, section 5.3.2.d. High Temperature Fire 1.) ...The second sentence to be changes to read "The entire external surface area of the recorder shall be exposed to the fire for a continuous period of at least 60 minutes.

(4) Environmental Standards. The environmental test procedures specified in EUROCAE ED-14C, "Environmental Conditions and Test Procedures for Airborne Equipment, " dated December 1989, and Radio Technical Commission for Aeronautics, Inc. (RTCA), Documents No. RTCA/DO-160C, "Environmental Conditions and Test Procedures for Airborne Equipment," dated December 1989, shall be used.

(5) Software. If the equipment design includes a digital computer, the software must be developed in accordance with RTCA Document No. DO-178B, "Software Considerations in Airborne Systems and Equipment

Certification," dated December 1, 1992. In accordance with RTCA/DO-178B, Paragraph 9.3, the applicant must submit the following documents to the Manager Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), having purview of the manufacturer's facilities, for review and approval.

Plan for Software Aspects of Certification (PSAC)
Software Configuration Index
Software Accomplishment Summary

All data supporting the applicable objectives found in Annex A, Process Objectives and Outputs by Software level, must be available for review. For software developed prior to the availability of RTCA/DO-178B, Section 12.1.4 provides a method for upgrading a baseline for software development so that changes can be made in accordance with the criteria contained in RTCA/DO-178B.

NOTE 1: The FAA recommends that the PSAC be submitted early in the software development process. Early submittal will allow the applicant to resolve issues with the Software Aspects of Certification Plan, such as partitioning and determination of software levels.

NOTE 2: The applicant should substantiate software levels in the safety assessment process outlined in RTCA/DO-178B. If the equipment incorporates more than one software level, appropriate partitioning of different software levels is required. As an alternative to substantiating the software level(s) in a safety assessment, the applicant may develop all software that affects navigation and integrity functions to at least the Level C criteria.

b. Marking. To comply with the Code of Federal Aviation Regulation (CFR) Section 21.607(d), The Technical Standard Order Authorization (TSOA) holder shall identify the software and hardware with the part number, or shall utilize a separate part number that identifies the software and hardware. The part number shall include the software

version and level(s) in accordance with RTCA/DO-178B, and the modification status of the hardware (drawing revision or dash number).

NOTE: If multiple software levels are marked, the installation instructions must clearly identify the software level for each function.

(1) The TSOA holder shall legibly and permanently mark each separate, major component of equipment with the name of the manufacturer, the TSO number, and the part number, if the Administrator finds that such marking is necessary in the interests of safety.

c. Data Requirements.

(1) In addition to 14 CFR Section 21.605, the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having geographical purview of the manufacturer's facilities, one copy each of the following technical data:

- (i) Operating instructions and limitations.
- (ii) Installation procedures and limitations.
- (iii) Schematic drawings applicable to installation.
- (iv) Wiring diagrams applicable to the installation.
- (v) Specifications.
- (vi) List of the major components (by part number) that make up the equipment system complying with the standards prescribed in this TSO.
- (vii) An environmental qualification form as described in RTCA/DO-160C.
- (viii) Manufacturer's TSO qualification test report.
- (ix) Nameplate drawing.

(x) The appropriate documentation as agreed upon between to ACO having geographical purview of the manufacturer's facilities and the applicant. As a minimum, the plan for Software Aspect of Certification (RTCA/DO-178B, Paragraph 11.1) and the Software Accomplishment Summary (RTCA/DO-178B, Paragraph 11.20) will always be required to be submitted.

(2) In addition to those data requirements that are to be furnished directly to the FAA, each manufacturer must have available for review by the Manager of the ACO having purview of the manufacture's facilities, the following technical data:

(i) A drawing list, enumerating all of the drawings and processes that define the article's design.

(ii) The quality control functional test specification used to test each production article to ensure compliance with this TSO.

(iii) Equipment calibration procedures.

(iv) Corrective maintenance procedures (within 12 months after TSO authorization).

(v) Periodic maintenance and calibration procedures.

(vi) Schematic drawings.

(vii) Wiring diagrams.

(viii) The results of the environmental qualification tests conducted in accordance with RTCA/DO-160C.

(ix) The appropriate software documentation as agreed upon between the ACO having purview of the manufacturer's facilities and the applicant. The documentation available should be identified in the Plan for Software Aspects of Certification (RTCA/DO-178B, Paragraph 11.1) and the Software Accomplishment Summary (RTCA/DO-178B, Paragraph 11.20)

(3) In addition, the manufacturer must furnish to the user of the article one copy of the data and information specified in paragraphs (c)(1)(i) through (c)(1)(vii) and paragraph (c)(2)(v) of this TSO. This data and information is necessary, for proper installation and use and for continued airworthiness of the product or article. The manufacturer also must furnish the user a note with the following statement:

"The conditions and test required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if further evaluation by the applicant (user/installer) documents an acceptable installation and is approved by the Administrator."

e. Availability of Reference Documents.

(1) Copies of EUROCAE Document No. ED-56A, ED-55 and ED-14C may be purchased from the European Organisation for Civil Aviation Electronics, 11 rue Hamelin, 75783 Paris Cedex 16, France.

(2) Copies of RTCA Documents No. DO-160C and DO-178B may be purchased from the RTCA, Inc., 1140 Connecticut Avenue, NW, Suite 1020, Washington, DC 20036-4001.

(3) Code of Federal Aviation Regulations, Part 21, Subpart O and Part 25, Subpart D, may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325.

(4) Advisory Circular 20-110, "Index of Aviation Technical Standard Orders," may be obtained from the U.S. Department of Transportation, General Services Section, M-443.2, Washington, DC 20590.

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Aircraft Certification Service